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Conducting Field Research in Elementary Education
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FOREWORD BY ISSUE EDITOR

The articles that follow have in common the purposes of examining problems in the design and conduct of field studies in elementary education, and of pointing out ways of solving these problems. All of the authors are, or recently have been, involved in the conduct of field studies in elementary schools. While several of these studies are mentioned, they are referred to only to illustrate problems in conducting such studies. Most of what the authors have written applies also to research conducted in secondary schools.

It is not the purpose of this special issue to give either a complete or a unified picture of field research. Instead, there follows a series of related articles, each reflecting the viewpoint and experiences of its author.

The initial article (Heathers) considers the general objectives and problems of conducting field research in elementary education. The three articles that follow treat three essential aspects of field studies: accomplishing organizational changes in schools (Bishop), conducting the in-service education of teachers (Trachtman), and evaluating the changes being studied (Kaya). The article by Durrell treats all three aspects in relation to a study of one educational plan.

The articles by Carton and Eigen discuss research on foreign language in the elementary school, and on field testing "teaching-machine" programs, respectively.

The article by Richard C. Anderson proposes a role for an "educational engineer" who would build a bridge between research findings and educational practices. The final article by Robert H. Anderson outlines how schools and universities may work together in conducting field research.

It is hoped that these articles will be of interest to educational leaders generally and that they will be of value both in increasing the understanding of educational research, and in stimulating improvements in such research.

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FIELD RESEARCH ON ELEMENTARY SCHOOL ORGANIZATION AND INSTRUCTION

Glen Heathers

American education is undergoing intensive examination and is in process of fundamental change. In these developments, concerns about quality are at least as evident as concerns about quantity. Not only are we seeking ways to provide more schools and more teachers, or more efficient uses of the schools and teachers we possess. Also we are seeking ways of raising the calibre of education, from kindergarten through college, to a level of excellence.

It is appropriate that many of the efforts to improve American education are being expended on our elementary schools. Successes and failures at this stage are compounded through all the later stages of the student's educational development. If the early grades teach the child to read and write and speak with skill, to study well and think clearly, to learn independently and in group situations, to live to learn and love to learn; then the quest for excellence in education is in good part won. If these aims are not realized in the elementary schools, the quality of education at all levels suffers, and the costs of education mount; standards drop, progress slows, and remedial teaching holds the center of the educational stage.

Trying and evaluating changes in elementary schools is not a post-Sputnik phenomenon. This process has been underway continuously in most of our schools since they were founded. Various patterns of school organization have been tried—the Winnetka Plan, the Dalton Plan, the Co-operative Group Plan, the Platoon Plan, and so on. Multitudes of innovations have been tried in curriculum, instructional materials and devices, evaluative instruments, and teaching methods.

In the past these changes usually have been introduced on an informal "try-and-see" basis, rather than being tested in carefully-designed research studies. This sort of common-sense "experimentation" has value, and educators have, in the process of trying various innovations in elementary schools, learned a good deal about what works and what doesn't.

The difficulty is that informal evaluations very often do not tell enough to provide dependable bases for accepting or rejecting a change that has been tried. Also it is usually hazardous to attempt to apply findings of informal studies conducted in one school system

to other school systems, since the influence on the findings of local conditions in the particular school system has not been determined.

In evaluating any educational change, careful measures are needed, not only of the subject-matter learning outcomes that may be influenced by the change, but also of possible "side effects" of the change (such as effects on pupils' adjustment, on attitudes of teachers and parents, or on costs). Careful measures also are needed of how the changes being tested are placed in operation, and of local conditions in the school system where the changes are tried. Otherwise, there is danger that the actual factors determining the results obtained will not be identified.

Fortunately, the present educational "campaign" includes features that promise great improvement both in the quality and quantity of educational research. Large sums are now being spent on research in education. Of particular importance, this financial support has permitted the establishment of numerous major research programs that involve school-university cooperation. The number of well-trained researchers studying problems in education is increasing rapidly. Finally, interest in research on the part of educational leaders in universities and in public schools is higher than ever before. Increasingly, educators are asking that a careful research evaluation be built into each try-out of an educational innovation. It may be that these influences will immediately usher in a Golden Age of educational research, but it appears more likely that it will take a decade or two for such research to become organized and tooled to meet the great demands now being placed upon it.

Most educational research is "applied research" that is related to the practice of education in schools, rather than "basic research" that is concerned with developing and testing educational theory. The "pure researcher" often deplores this fact, claiming that fundamental improvements in educational practice must depend on basic research findings. This claim is at least partially true, but it ignores two essential facts. One is that the schools must run while educators await the findings of basic research. The other is that the findings of basic research must always be engineered into educational practice. Applied research is necessary, both to help educational leaders adapt basic research findings to educational practice, and to help them develop and evaluate educational programs based mainly on "common-sense" principles derived from "experience." It is essential to bear in mind that many years must pass before basic research will undergird the practice of education with an adequate structure of laboratory-tested principles of learning, thinking, motivation, personality development, group process, administration, and so on.

There are three ways in which the applied researcher can help educators improve the practice of education. (1) Through his knowledge of theory and of research findings, the researcher can help the educator take account of various educational goals, and of various factors influencing the achievement of these goals, that he otherwise might ignore. For example, most educators pay too little attention to the goal of self-directed learning, and to the types of learning situations that foster this goal.

(2) The researcher can develop objective and practical measures of educational variables. These variables include the numerous immediate and long-term goals of education, and the many aspects of the total learning situation that may play a part in determining the achievement of these goals. Achievement tests illustrate measures of goals, while intelligence tests, reading-readiness tests, and tests of teachers' educational values illustrate measures of factors influencing the attainment of goals.

(3) The researcher can conduct studies that determine the relationships between certain aspects of educational practice and the attainment of certain educational goals. This is the pay-off in educational research. It is chiefly through establishing dependable "cause-and-effect" relations between educational practices and their outcomes that the researcher can offer educational leaders guidance in improving school organization, curricular materials, teaching aids, teaching methods, or administrative procedures.

It is important to recognize that the researcher cannot, and should not, answer value questions concerned with deciding which educational outcomes are good or bad, better or worse. Determining the goals of education is a responsibility of school leadership. What the researcher can do is provide measures of educational outcomes, and information on the effectiveness of various educational practices in achieving these outcomes. The outcomes he measures in relation to certain educational practices may be immediate or remote in time. Both are of concern to policy makers. Thus, teaching children in elementary school to conduct experiments in science may improve their understanding of science as measured by appropriate tests, and it may increase the likelihood that they will elect science as a career upon graduation from high school. In either case, the researcher does not say that it is good to teach young children to conduct experiments. Instead he says what this practice is good for, and how good (i.e., how effective) it is in accomplishing whatever goals he measures in relation to the practice in question.

During the past five years, a considerable number of large research projects have been established to test new plans for organizing and

conducting instruction in the elementary school.[1] In some quarters these studies have been greeted with enthusiasm, in other quarters, with reactions ranging from skepticism to open hostility. These varying reactions offer a rich field of research to the educational sociologist. For example, to what extent are negative reactions to these projects due to the fact that the plans being tested threaten the established interests of professional educators in the universities and in the schools?

An important basis for conflicting attitudes toward projects in the elementary school that involve specialist teaching, teacher teams, departmentalization, ability grouping, cross-graded grouping, etc., is disagreement about ways of realizing the essential goals of the elementary school. Most, if not all, of the new plans are intended to improve on the "self-contained classroom" with respect to the child's intellectual development, without detriment to his personal-social development. Many opponents of these plans claim that they are, by their very nature, detrimental to the personal-social development of "the whole child." It should be noted that it is not the researcher's task to take sides on this issue. His job is to conduct objective evaluations that determine the extent to which these plans accomplish the various goals that are of concern to educators in both camps. It should be recognized that the intellectual and personal-social goals of education are interrelated. Indeed, it may turn out that one or more of the new plans improves on the self-contained classroom in fostering both personal-social and intellectual development. Research evidence, not argument, must be relied on to provide the answers needed. And it is a fact that, to date, there is very little research evidence to support the claims made for any elementary school plan, the self-contained classroom plan not excepted.

Some of the adverse criticism of the projects in question has to do with research design, or with the reporting of research findings. In some instances, persons involved in these projects, or publicists speaking or writing about them, have made claims for the plans being tested that went beyond the research evidence. Criticism of this practice is justified, provided that the critic addresses himself to the persons responsible for the unwarranted claims, rather than attacking the research study itself. With very few exceptions, educational researchers are careful to distinguish the hypotheses they are testing from findings based on evidence, and are conservative rather than evangelic when generalizing about their findings. Dean Keppel of

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[1] See Morse, Arthur D., *Schools of Tomorrow—Today*. Albany, New York: University of the State of New York, State Education Department, 1960.

the Graduate School of Education at Harvard has cautioned against tendencies to make extravagant claims for educational innovations.[2] Lieberman[3] speaks to the same point and decries pressures that make it difficult for one to report failures of plans as readily as he reports their successes. After all, the only research that fails is poor research. In research, negative findings are as valuable as positive findings.

There is need for a clear understanding among educators, laymen, and researchers as to what one should expect from a field research study, and as to the proper strategy of conducting field research in education. All of the current field studies of educational plans, or of new curricular materials, or of devices such as television or teaching machines, should be recognized as pilot studies, rather than definitive studies. These pilot studies will do very well if they accomplish effective implementation of the innovations being tried, if they provide tentative findings as to the effects of the innovations on achieving various educational goals, and if they show the way toward further studies.

The demand that initial studies of new plans, procedures, or materials be set up as adequately-controlled studies that compare the old with the new is naïve and unrealistic. Comparisons should be made, insofar as is practicable. But controlled studies require a great deal of knowledge of the variables involved, and of the special provisions required to bring these variables under control. Studies involving inadequate control of relevant factors are apt to yield misleading results. Usually pilot studies are needed to prepare the way for controlled studies.

Anyone venturing to do field research on an educational plan quickly discovers that, in attempting to implement and evaluate the plan, he opens a large Pandora's box of research questions that must be answered as part of the test of the plan. When he sets about the task of measuring educational outcomes under the plan, he finds that a whole array of new measuring techniques and devices is essential. Implementing the features of the plan to be tested inevitably requires the development of new materials and procedures. Even when these requirements have been met, the task of implementing the plan has only begun. Any experienced educator knows that no plan can be implemented effectively until teachers have learned to bring its organizational structures to life in the classroom. The in-service

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[2] See article, "No Magic Formula," by Fred M. Hechinger in The New York Times, February 12, 1961, Section E, p. 7.

[3] Lieberman, Myron. The Future of Public Education. Chicago: The Unisity of Chicago Press, 1960, pp. 253-4.

education of teachers is at the very heart of the test of any educational innovation that places new demands on teachers.

An important consequent of the present spate of field studies in education should be the stimulation of fundamental developments within the field of educational research. (1) The schools of education need to give much more attention to research, rather than restricting themselves largely to preparing teachers. There is an especial need for research on teacher education. (2) Schools of education should demand a higher level of research competence before granting the doctorate. The doctoral thesis, often a minor study utilizing whatever data come readily to hand, should be either a basic research study, or an investigation focused on a problem directly related to educational practice. (3) Researchers from the graduate departments of psychology, sociology, and other fields should be attracted into educational research. (4) A corps of field researchers should be trained to provide each school system or school district with a staff member capable of performing well-designed local research studies, and capable of helping school administrators and teachers translate research findings into classroom practices. (5) School administrators should be given a sound introduction to the nature and values of educational research as the basis for taking part in school-university research projects, and for encouraging and supporting research by local staff members.

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THE ROLE OF THE LOCAL ADMINISTRATOR IN REORGANIZING ELEMENTARY SCHOOLS TO TEST A SEMI-DEPARTMENTALIZED PLAN

David W. Bishop

Henry Steele Commanger, in a speech at the University of Maine in the summer of 1960, expressed his conviction that the strength of this nation was derived from its drive for change, its willingness to undertake the new and different, and its lack of fear of the unknown. Change is vital and vitalizing. This is no less true in education than in any other facet of our national endeavor. There is today, possibly more than at any other time, a climate of change in education; a climate built of charge and countercharge, examination and re-examination, assessment and reassessment, and expansion and retrenchment. The search and struggle for improvement, and the seeking of education's "new frontiers" engender a greater excitement in the professional than he has ever known.

Despite contradictions in the niceties of the philosophies expounded by submariners, historians, editors, writers, and educators, there is general agreement among us all that the education of our children must be balanced in its attention to mental, emotional, social, physical, and moral and spiritual needs. It is, has been, and will be, impossible for the school to nurture the academic while starving the social, to build the physical while destroying the emotional, or, indeed, to favor any to the total exclusion of all else. The countless changes and innovations in teaching technology, methodology, and approach serve to better do those things we all desire.

So, too, does organizational change. Organization serves. It has no other function. It serves to bring students and teachers together in a way which will provide balance without denying the fullest realization of educational aims, individual freedom under social law, and that impact of one individual on another which is the very core of teaching. It serves to provide optimal opportunity for the full utilization of individual teaching talents and individual student potential. Organization serves the teacher that he may better serve the child.

The school administrator today is in a happy situation. The public he serves is ready for change, expects it. While more knowing in educational matters and more interested than has been generally true in the past, the public, in its expectation, will accept organizational change on faith. Growing doubt of and dissatisfaction (undefined) with the status quo, the climate of educational foment, and, in highly competitive areas, the constant search for community status

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symbols are factors creating this acceptance. With the professional rests only the responsibility that he keep the faith.

As one who has been in large part responsible for a major shift in organizational pattern in the elementary schools of our district (a shift, incidentally, bitterly opposed in some educational squares), I recognize clearly that a sincere and abiding belief in the probable improvement engendered by the change in pattern, and in the opportunity for betterment inherent in the organization, is an absolute necessity for the school administrator contemplating change. I believe that there is value in change for the sake of change. I do not believe this value is enough. The decision of the Ossining district to participate with the Long Beach (Long Island) Public Schools, and the Experimental Teaching Center at New York University in a test of the semi-departmentalized Dual Progress Plan[1] was made on the basis of what the plan would probably contribute to our educational program. The adoption, in September 1958, of the plan in grades 3-6 at Ossining, was determined by our belief that such an organization of our elementary schools would better serve our educational needs and purposes.

In essence, the Dual Progress Plan provides grade-level grouping and advancement in the language arts-social studies "core" and in physical education, non-grade-level grouping and advancement in mathematics, science, art, and music. In the plan, all elementary teachers of grades 3-6 are assigned, full-time, to one of the six "specialties" just listed.

It is natural that the evaluation of an educational program entails evaluation of organization. Identification of improvement and outcomes depends considerably on what the organization is and what it sets out to do. It is virtually axiomatic that the success of program and organization is determined, in no small part, by the manner in which they are instituted and implemented. It is even possible that evaluation can be skewed by the source of the idea of the new pattern. See how educational hackles rise to Rickover and are smoothed by Conant. Their ideas are not that divergent.

The philosophy of the Dual Progress Plan came from Dr. George D. Stoddard, Chancellor of New York University. The program evolved during 1957-58 through months of planning by a "Working Party" meeting at New York University, composed of elementary specialists, school administrators, subject consultants, child psychologists, and research personnel. Both philosophy and plan might well

[1] Stoddard, George D., "The Dual Progress Plan." *School and Society*, Vol. 86 (October 11, 1958), pp. 351-352.

have been developed by local staff study (as was our junior high program four years ago), by joint lay-professional study (as was our local Dual Progress Plan report form), by system administrative study (as was our scheduling and building operation), or by other means. What is really important is that the seed was planted, nurtured by administrative interest, and cultivated by the tender loving care of professional personnel. We did not deem it necessary, nor has experience proven otherwise, to put the matter of adoption of program to the vote of teachers or public. We did deem it mandated that both groups be as fully informed as possible—the public through group meetings, informational releases, and conferences; the teachers through individual conferences, and large and small group meetings. To an extent, these processes continue today. Of course, the board of education had to approve our trial of the Dual Progress Plan.

There is involved here an administrative philosophy which runs counter to that propounded in the current literature of educational administration and supervision. We believe that, as well as the development of staff leadership, leadership, itself, is a function of the school administrator. The ability to make decisions and to implement them is a necessary tool for successful administration. This does not, of course, deny the concomitant responsibility to recognize all possible factors involved. It simply maintains the right of responsible leadership to lead.

Evaluation of organization is determined by what the organization is and what it sets out to do specifically, within the broad aim of better serving educational needs and purposes. The Dual Progress Plan involves specialist teaching, ability grouping, and semi-departmentalization with ungraded classes in certain subject areas. Team-teaching may involve something else, as may team-learning programs and the "self-contained classroom." It is obvious that the results of our program, or those of any other, cannot be attributed to the organization until it is operational. Much of making it so is administrative by nature. Some, necessarily, intimately involves teachers.

Teacher area assignments for specialist roles in the Dual Progress Plan were made by the school principals in as close correspondence as possible with the choices of the teachers themselves as indicated in individual conferences. Three choices, in order of preference, were solicited. In those instances where a choice other than the first was selected, teachers were again consulted and offered the opportunity to change schools (none accepted) in order to gain the preferred specialist role. Assignments of particular ability sections to particular teachers were made by the principal from his knowledge of strengths and weaknesses and, to some extent, desires of teachers.

The staff was involved in the grouping for the language arts-social studies "core" area, but not in the grouping for the departmental subjects. The differentiation was predicated on the nature of the grouping procedure; on the one hand, general and relatively traditional; on the other, specific and new. Time pressures played a part here, as did our desire to produce an efficient and effective procedure. As the year progressed, modifications of groups were made on the request of teachers. These changes were approved when student need was ascertained. A tight administrative rein was held on all facets to insure that basic design was followed.

Despite severe limitations of time which curtailed opportunity to complete teacher orientation and solve anticipated problems, the decision was made to begin the program in September. We felt our staff capable of making the precipitate adjustment and believed that the mechanical problems of organization could be more quickly and clearly perceived and solved by jumping in than by dipping a toe. This turned our fairly well. Many of the problems we had anticipated did not occur. Adjustment to the new organizational pattern was rapid. Our mistake was in assuming that a great deal of meeting time had to be spent in the orientation of teachers to the philosophic ramifications of the organization when, in reality, teachers were more concerned with the how than the why.

With the start of school, we had a semi-departmental program. Our student body was grouped for instructional purposes. Our teachers were assigned specific subject areas. Except for teacher involvement in pupil grouping and teacher indication of choice of assignment, the accomplishment of each of the above was a purely administrative task. Principals and central office staff worked the entire summer to bring them about. Their being accomplished in fact, however, did not mean their being accomplished in essence.

It is at this precise point that the administrative function changes from direction and guidance to assistance, for it is at this point that the teacher is all. The success of grouping is dependent upon the teacher's use of the group and segments of it. I suspect that the lack of significant results from homogeneous grouping in the past rests, in large part, in the failure of teachers to adapt teaching method to the nature of the group. In the final analysis, too, only one person can assure the success of specialization, or the knitting together of a team. This person is not the administrator, but the teacher.

One needs to distinguish between aiding the teacher in achieving full utilization of organization, and in escaping from it. For the administrator this frequently involves deciding to make no decision, and at the same time, explaining exactly why. Teachers, in all their

humanness, do look back in time of difficulty to the time when the difficulty was not present. To return to the past serves only to escape the problem, not to solve it. The decision to make no decision does not mean ignoring the problem and does not negate the absolute responsibility of the administrator to provide real help in solving the problem posed. Time alone will not answer all questions, but time is needed to find the answers.

The administrator must be honest with self and with staff. He cannot allow himself to be blinded by his belief in the new organizational pattern to the exclusion of real perception of teacher's problems and suggestions for modification. This entails full investigation by administrator and teacher, a search for answers or alternatives, and, finally, a decision based on reason. There is need to protect design but no justification for holding it totally inviolable. Minor changes may alleviate an eventual necessity for major ones.

As we look back from a vantage point of two-and-a-half-years' experience with a new elementary organization, from a point where the basic facets of that organization are to a greater, rather than lesser, extent in effect, we cannot help but view with satisfaction the things accomplished. Certain factors of our implementation of the program assume considerable importance in retrospect. It was important that the administration held to itself the right of decision. It was equally important that teachers were constantly involved in the process of arriving at decisions where they wished to be involved, and where matters under consideration had direct bearing on the teaching-learning dichotomy.

It was important that the nature of our staff was such as to permit our jumping into the organization per se, and that we did so. It was important that the staff (even those in opposition to the change) was willing to expend the time and effort necessary for a fair trial of the program. It was important that real assistance was provided teachers in solving problems.

But most important, was the feeling pride of us all, teachers, administrators, and community, in undertaking a new endeavor which, despite attacks and belittling from some quarters, has placed us at the forefront of American education. Change is vital and vitalizing!

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THE ROLE OF AN IN-SERVICE PROGRAM IN ESTABLISHINIG A NEW PLAN OF ELEMENTARY SCHOOL ORGANIZATION

Gilbert M. Trachtman

In-service traditionally refers to the training of teachers in service and implies a teacher-centered, administration-imposed supervisory program. However, in implementing a total reorganization of the Long Beach, New York, elementary schools, as is required by the semi-departmentalized Dual Progress Plan, it quickly became apparent that all of us—teachers, specialists, supervisors and administrators—were learners. There were no answers available for some to spoon-feed the others, and it was obvious that implementation of this new program would proceed most effectively through goal-centered group activity in which all members of the educational staff worked together.

In this context then, in-service as used in this article has two different meanings. In the narrower sense it refers to the specific in-service courses made available to teachers as part of the program for developing elementary specialist teachers in various subject areas. In a broader and more dynamic sense, in-service refers to the total massive effort by all staff members involved in the Dual Progress Plan—a massive effort involving learning by doing, learning by sharing, learning by observing, and even learning by complaining. Administrators and supervisors have learned more from teachers than they have been able to teach them. Consultants and experts provided by the Experimental Teaching Center at New York University have furnished valuable assistance, but have also frequently learned as much as they taught.

The program for in-service development of our staff was not based on long-range plans, but was shaped and re-shaped each semester in an attempt to recognize and face implementation problems as they became apparent. This procedure is still in process, and it is, therefore, pointless at this time to attempt the laying down of guidelines or principles for others to follow along the rocky road of elementary school reorganization. However, a brief chronicle of the sequence of our experiences to date may allow the reader insights pertinent to his own situation.

The Dual Progress Plan is being demonstrated and tested in grades 3-6 of the Long Beach and Ossining elementary schools in

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cooperation with the Experimental Teaching Center at New York University, under a Ford Foundation grant. This grant began in July, 1958. However, in Long Beach it was decided that the first semester should be devoted to preparation, with actual implementation beginning in January, 1959. The summer of 1958 was devoted to administrative planning, and in early September each principal, working with his faculty, designated each teacher as a specialist in some subject area based on training, background and expressed preference. In some cases no teacher in a school possessed a solid background in a particular subject. Specialist assignment was then based on a teacher's expressed willingness to "take on" this assignment and to begin training as a specialist in that area. Teachers and administrators both realized that labeling could not create a specialist, and the immediately felt need, therefore, was to provide in-service help for teachers in their "specialty." This necessitated setting up a program which would cut across school lines, bringing teachers together by subject area. At the same time it was necessary to arrange series of meetings, school by school, to deal with planning and implementation problems of a local nature, and district meetings to deal with general policy and planning, and orientation towards the new program.

In a study of obstacles encountered in programs of in-service education, Weber[1] found two major problems to be most prevalent: (a) time and work load pressures; and (b) an unprofessional attitude among teachers. An attempt was made in Long Beach partially to anticipate the first problem. A program of early dismissal was inaugurated on a regular basis, with school dismissed an hour earlier on Wednesdays. This time, one hour each week, was reserved for all planning and orientation meetings. Meetings varied from week to week. Some focused on one or another local school, others on certain subject areas, others were district-wide. Some were only with teachers, some with administrators, some with both. Some meetings were conducted by the Superintendent of Schools, some by the Research Coordinator, some by special service personnel. Representatives of the Experimental Teaching Center conducted many meetings and participated in others. On any given Wednesday, those teachers not involved in a scheduled meeting were free to remain at their own school, using the time for clerical work, parent conferences, or lesson planning. Some principals utilized such occasions for additional planning conferences with groups of their own teachers. Although at-

[1] Weber, C. A. "Obstacles to be Overcome in a Program of Educating Teachers In-Service,"*Educational Administration and Supervision,* Vol. 28, December 1942.

tendance at all of the above-described conferences was mandatory, these meetings were all conducted during regular school time and so constituted no additional burden on the already overburdened teachers.

The second major obstacle defined by Weber—an unprofessional attitude among teachers—proved to be no problem in Long Beach. A regular program of in-service courses, covering specific subject areas for specialist teachers, was organized after school hours. These courses met late on Wednesday afternoons, and registration was on a completely voluntary basis. Nevertheless, despite teachers' heavy schedules, and despite the fact that teachers at this time were fairly evenly split on their attitudes toward the Dual Progress Plan, 90% of all teachers involved registered for these courses. The highly professional attitude of the Long Beach staff may be further demonstrated by the fact that, although a salary differential is paid for the accumulation of in-service credits, many teachers registering for these courses had already amassed maximum differential and would receive no material benefit from participating.

Each in-service course consisted of fifteen two-hour sessions extending through a school term. Each term a new program of courses was organized as needs or perception of needs developed. This ongoing program of courses, now ending its third year, proved to be a crucial factor in the implementation of the Dual Progress Plan. The program met certain needs, providing concrete assistance and preparation for some teachers, security and support for others, and opportunity for exchange and professional growth for still others. It pointed up certain other needs which we were then able to meet, such as the need for local supervision of certain curricular areas, hitherto unassigned to any one individual, or the need for a different type of curriculum adaptable to Dual Progress Plan philosophy. It failed to meet some needs, and, therefore, we are still making changes, modifying the nature of our courses each term, and looking elsewhere for the solutions to some of the unmet needs. Thus, for example, the problem of how to achieve better results with low-ability groups may ultimately be attacked through an in-service course on methods of teaching slow learners, through a program of classroom supervision utilizing experts in special education techniques, through curricular revision, through refinements in grouping criteria, through improvements in programming and scheduling techniques, or through some combination of the above and other possible approaches.

Organization of the initial program of in-service courses was greatly simplified by the semi-departmentalized plan for which we were preparing. The immediate anxiety felt by most teachers was in regard to their readiness or competency to assume the specialist role,

and the immediate demand was for aid in preparing for this role. Thus, a series of courses was organized utilizing some of our own subject specialists and outside specialist consultants in particular fields, such as language arts-social studies, or mathematics. These experts were provided or recommended by the Experimental Teaching Center. During the first semester teachers hungrily absorbed teaching tips and techniques, demonstrations of lesson planning approaches, and presentations of new teaching materials—all aimed at their particular subject area.

In January 1959, the first stage of the plan was put into operation and teachers began functioning as specialists in the semi-departmentalized program. Thus, as the second semester of in-service began, teachers began to participate more actively in each course, bringing in actual problems and situations for discussion or advice. Although the outside experts continued to be exceedingly helpful in many cases, by the end of the first year it became apparent that there were certain inherent limitations to their usefulness. Once the in-service courses attempted to move from theoretical presentation to practical application, there was need for follow-through from the course to the classroom. Many problems could not readily be appreciated by an outside consultant unfamiliar with the actual operation of the Dual Progress Plan. Curriculum development had to proceed from an intimate knowledge of the existing program.

Thus, developing out of the in-service courses, was the growing recognition of the need for local leadership. This resulted in the development of a supervisory team with responsibility eventually defined for each subject area. In some areas high school departmental chairmen were given K-12 supervisory responsibilities; in other areas DPP subject consultants were appointed from staff. Gradually, local staff supervisors took over the leadership of in-service courses until in September 1960, all in-service courses were conducted by local personnel. The Experimental Teaching Center continued its cooperative role with concomitant modifications. In some cases local staff supervisors made regular visits to the University to work with Experimental Teaching Center consultants on problems of curriculum development. In other cases University consultants visited Long Beach to consult with local staff on problems of classroom test construction, grouping procedures, etc.

In addition to the in-service courses conducted primarily for teachers in the Dual Progress Plan, several additional courses were offered each term at other times of the week, primarily so that K-2 and secondary teachers might also enjoy the opportunity to benefit from local courses. Courses were offered in such diverse areas as Test

Construction for Classroom Use, Audio Visual Techniques, Speech for the Classroom Teacher, Teaching the Slow Learner, Developmental Reading, Working with Parents, Transition to Adolescence, and Understanding the Child Through Psychological Evaluation. Many of these courses were also attended by specialist teachers in the Dual Progress Plan since most of the topics covered in these courses tended to cut across all subject areas.

At the same time, the creation of an organized supervisory staff, stemming from needs indicated by the program of in-service courses, resulted in the gradual introduction of an even broader program of in-service development. During the first year, series of routine conferences had been scheduled with various groups. A Teachers Advisory Group, including two representatives from each school, had met frequently to discuss problems connected with implementation of the Dual Progress Plan and to serve as a direct communication link between faculty and administration. A series of conferences had been held with special service personnel, discussing their role in the new program. A series of meetings had also been conducted with the Superintendent, principals, and supervisory staff, concerning implementation policies. Representatives of the Experimental Teaching Center had participated in many of these sessions. All of this culminated in the 1959 Summer Working Party, consisting of principals, supervisors, special service personnel representing psychology and guidance, and representative specialist teachers. This group participated in a workshop devoted to planning and problem solving for the year ahead.

During the second year, in-service courses began to focus on the need for curriculum revision, and some in-service groups began actual work on curriculum development. This culminated in the 1960 Summer Working Party, consisting mainly of subject supervisors, principals, and specialist teachers working on the development of new curriculum sequences in language arts-social studies, mathematics, and science. The newly prepared materials thus became the basis for the next series of in-service courses and, simultaneously, a series of district-wide meetings was scheduled for first- and second-grade teachers. These primary-level meetings, conducted in sequence by each of the subject supervisors, have aimed at the introduction of new curriculum materials and approaches in each subject, with the goal of articulation between teaching in the primary grades and in grades 3-6 under the Dual Progress Plan.

At this writing, the total in-service program is undergoing still another change in emphasis. In-service courses for the next term will focus on more specific goals in each subject area. One group will

work solely on expansion and elaboration of the present curricular sequence. Another group will focus on broad enrichment of content background for the specialist teacher. As each course becomes more specialized in approach, it is expected that a smaller percentage of each group of specialist teachers will choose to enroll. To compensate for this, and to maintain ongoing interaction and communication, all specialist teachers of a particular subject will meet monthly with their supervisor. Meanwhile many problems relating to grouping and scheduling of students remain, and these will probably be the next major areas for improvement. With three years almost ended, it would seem that a full five years is indicated for a total in-service attack upon the problem of implementing a complete educational program. However, with the lessons we will have learned by then, it would not be impossible under similar circumstances in future to accomplish such a program in three years.

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PROBLEMS IN EVALUATING EDUCATIONAL PLANS IN THE SCHOOL SETTING

Esin Kaya

In evaluating an educational plan in a school setting, several types of problems occur. Some are specific to an individual plan, or to the particular setting within which it is implemented. Others are common to the evaluation of most plans and are fundamental. The purpose of this paper is to discuss some of these fundamental problems, and to suggest possible ways of solving them. Three general problem areas will be considered. These are problems related to "operationalizing" the features of the plan to be tested, to designing the resarch evaluation of the plan, and to choosing instruments to measure the features and outcomes of the plan.

All too often, the educational plan to be tried and evaluated is not sufficiently operationalized prior to its implementation. Operationalizing a plan requires a highly specific statement of the goals or outcomes the plan is intended to achieve, and of the features of the plan that are expected to lead to these outcomes. Educators usually name the goals to be achieved by the plan being tested. However, rarely do they define these goals in ways that permit an adequate evaluation of whether or not they have been attained. For example, the proponents of the self-contained classroom stress "the development of the whole child" as the central aim of the elementary school. Yet the concept of "the whole child" has not been specifically defined; because of this, it has not been possible to evaluate the extent to which the self-contained classroom actually fosters developing "the whole child." Another example may be found in the case of the multi-grade, multi-level plan that features heterogeneous grouping in order to achieve "the democratic way of living." Since "the democratic way of living" has not been defined explicitly, one cannot determine the extent to which this goal has been achieved. In practice, lumping together children of different ages and abilities becomes the definition of democratic life, as well as the way of achieving it.

Operational definitions are needed also in describing the features of the plan to be implemented. One hears of such features as "self-contained classroom," "specialist teaching," "ability grouping," "individualized instruction," and "nongraded advancement." Usually, none of these features is specifically defined prior to implementing a plan being tested. What is a self-contained classroom in observable terms? How much specialist teaching can there be and still have a self-contained classroom? What makes a teacher a "specialist teacher?" Is it simply a matter of teaching one subject all day long, or is special knowledge of the subject required? Does "ability grouping"

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refer to grouping children on the basis of the ability to think and plan and create, or merely on the basis of IQ scores? Does "individualization of instruction" occur only in a tutorial relation, or can it occur in whole-class teaching? If children advance in different subjects without regard to grade levels, as is suggested by "nongraded advancement," on what actual bases do they advance? Clearly, one must know specifically what features of a plan are being implemented, and to what extent, if one is to conclude that the measured outcomes are due to the features of the plan.

The inability to relate outcomes to the specific features of the plan leads to false generalization. One often hears such comments as "Departmentalization in the elementary school was tried and rejected years ago," or "It doesn't matter what plan you try. If you have good teachers, you'll get good results." Such comments usually reflect emotional commitments to a particular plan for organizing instruction, rather than reliance on research evidence. Legitimate conclusions based on research always specify the features of the plan that was tested, the conditions under which it was tested, and the outcomes of the test.

The purpose of implementing and evaluating a plan is to identify the effects of certain educational practices and organizational patterns on various educational outcomes such as knowledge, skills, productivity, decision-making, problem-solving, and so on. School systems need to be fully aware of this purpose if they are to execute their responsibilities in trying out a new plan.

School systems that test educational plans should spend a great deal of time preparing to implement a plan in order to ensure that it is the plan itself that is being evaluated, rather than mainly the setting within which it is being implemented. Such preparation should include making specific provisions for implementing each feature of the plan, securing the cooperation of staff members to be involved in the study, and giving the community as full an understanding as possible of the new plan and its expected outcomes. Before the final decision is made to test the plan in a given school system, the school leaders and the cooperating researchers should assure themselves that the school system is suitable for testing the plan, and ready to test it.

Private foundations or governmental agencies sponsoring educational research can help greatly in ensuring that new plans are tested adequately. These agencies can require, as a condition of providing financial support, that the features of the plan, and its expected outcomes, be operationally defined. Also, they can require that the study team make full arrangements for the try-out and evaluation,

and that the school system prepare itself adequately for placing the plan in effect. The "demonstration-test" of the Dual Progress Plan in part illustrates such preparation.[1] In the five-year period during which this semi-departmentalized plan is being tested in the Long Beach and Ossining school systems, its goals and features will have been systematically operationalized. It is extremely important to recognize that during this first try-out of the plan, it cannot be fully evaluated. The term "demonstration-test" applies mainly to demonstrating that the plan can be implemented effectively. An adequate evaluation of the outcomes of the plan cannot be made until its features and goals have been fully and specifically defined, and until the requirements for implementing the plan and for measuring its outcomes have been satisfied. It will take approximately five years to accomplish these things, thereby setting the stage for a proper evaluation of the plan.

Another service sponsors of educational research could provide is that of encouraging and financing systematic exchanges among researchers for the purposes of establishing agreement on operational definitions of variables. For example, many schools are trying "teamteaching" plans. In some instances, "team teaching" means having a hierarchical group of teachers who plan and share the instruction of a "pool" of students. In other cases, a class of pupils studies with one teacher during one-half of the day, and with another teacher during the other half of the day. Since these plans may have different advantages and disadvantages, generalizing about team teaching on the basis of studying one plan may not be justified. A further advantage of national exchange and coordination among researchers is that it can eliminate duplication of time and effort spent in developing operational definitions of such concepts as individualization, integration of learning, creativity, or self-directed learning. Although informal interchange among researchers occurs normally, its systematic coordination would result in greater efficiency in research, and in research products that could be readily understood by all researchers.

The second general area of problems related to evaluating educational plans is that of research design. The notion that all tests of educational plans require control groups that are matched with the experimental groups is rather sophomoric. When feasible, of course, controlled field experiments would be desirable. Such experiments may be feasible when one or two variables, such as the lecture versus the group-discussion methods of teaching, are the subject of study.

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[1] See Heathers, Glen, "The Dual Progress Plan." *Educational Leadership*, Vol. 18 (November, 1960), pp. 89-91.

When the plan to be tried is a comprehensive one involving many variables, controlled experiments present serious difficulties.

Often schools are matched on the basis of teacher salary schedules, social and economic composition of the communities, or ratings obtained from state surveys. These variables may serve as general indicators of some important characteristics of schools, but they do not provide sufficient bases for matching groups in a well-controlled study. There remain so many uncontrolled variables that the similarities on which the groups were "matched" become more misleading than helpful in drawing conclusions from the study. For example, whether or not a plan succeeds in a given school may hinge merely on the existence of an assertive teacher in the role of "Pied Piper." It would be rather difficult to predict, let alone control, variables of this type in matching school systems. Yet such specific variables may prove to be more crucial determinants of the success of a plan than the socio-economic level of the respective communities.

The problem of control in evaluating educational plans may be dealt with in two main ways. One statistical solution is to have large numbers of schools participate in the study in order to randomize errors, that is, to eliminate the effects of extraneous variables that might influence the results of the study. This solution is more readily applicable to trying out simple plans with only a few variables. To ensure proper randomization, the number of schools needed increases as a function of the complexity of the plan.

A second possible solution, which is more readily applicable to evaluating complex plans, is the use of pretest-posttest design, where a large number of variables is evaluated before the plan is implemented, and after it has been in effect for a given period of time. This design may be improved considerably by obtaining data on all measurable variables for several years before the implementation of the plan, and each year during its implementation.

A lengthy evaluation study which starts before the plan is put into effect and continues throughout the period of implementation enables the control of the "halo" effects resulting from special attention paid to the school, and of the already existing conditions in the school. Such control may be achieved by statistically comparing the findings obtained prior to the plan with the findings obtained under the plan. The quality of control will improve as larger numbers of variables are measured under both conditions.

It is quite possible to organize and conduct a comprehensive data-collection program involving variables related to teachers, administrators, pupils, and the community for a number of years before and after the plan is put into effect, if the sponsors of research allow ample time for planning and provide sufficient funds for staffing and

conducting such extensive evaluation programs.

A third general area of problems in evaluating educational plans concerns the evaluative instruments and their use. Existing standard tests of achievement, personality, and interests of pupils may have questionable validity in relation to the operationally-defined goals of a particular plan. For example, standard achievement tests rarely measure self-directed learning and creativity in a given subject area. Furthermore, their relation to the instructional materials covered in a particular school by a particular teacher has never been determined. Frequently when instruments are available to evaluate the knowledge, attitudes, and behavior of teachers and administrators, it is difficult to use them because they are perceived as personal threats. Finally, few people in schools are trained to interpret test scores with recognition of their limitations as well as their values for diagnosis and research.

No immediate solution can be offered to the problems concerning the development and use of evaluative instruments. First, more people need to become aware of the existence of such problems. The general areas of "construct validity" and "content validity" of standard achievement, personality, and interest tests, especially at the elementary school level, need a great deal more attention and study. More educators need to question what is being measured by current tests. Whether the test content is related to the variables that the educators really want to measure needs to be investigated. Until these questions are raised and answered, further test development along present lines will mainly complicate matters.

The question of validity, that is, whether the test measures what educators want to measure, may in part be answered if the goals to be attained have been operationally defined. For example, it is only after one defines "creativity in science" that one can construct a test with which to measure it. Then, whether or not the test measures the defined criterion may be established by statistical methods without great difficulty. It is extremely important to realize that a test should not determine the goals of instruction, as is now often the case. Instead, the goals of instruction should dictate the nature of the test.

The three general problem areas in evaluating a plan are in part interdependent so that solutions in one area can help provide solutions in another. It should be stressed that none of these problems is insoluble. Their solution depends on the joint efforts of sponsors of research, researchers, and educators in the universities and in co-operating school systems.

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IMPLEMENTING AND EVALUATING PUPIL-TEAM LEARNING PLANS

Donald D. Durrell

Pupil-team learning consists of combining children into pairs, threes, or larger groups for mutual aid in learning. It utilizes the natural tendency of children to work together. This desire should be encouraged whenever it promises to increase the amount and quality of learning; it should be avoided when it seems to diminish either.

Much school activity is based upon the theory that every lesson is a test of achievement, rather than a practice in learning. Each arithmetic paper, each written product, is marked by the teacher as though it were a terminal examination, rather than a single small step in the learning process. Pupil-team learning assumes that most school activity is practice toward achievement, and that mutual aid in this practice may be desirable. During learning practice, pupils may compare and correct answers, exchange ideas and evaluate approaches to problems, work together on plans or projects, and assist each other at points of difficulty. Sometimes they may present a team product rather than a collection of individual practice papers. Evaluation and analysis of the results of learning are, of course, based upon individual work.

The success of team learning depends upon the quality of the learning tasks in which it is employed. Good tasks are of a suitable level for the team, are clear and specific in requirements, and appeal to children as important. Every useful motivation should be employed to assure the learning disciplines satisfying to children. Allowing teams to progress as rapidly as they can master the material in arithmetic and spelling provides "knowledge of progress" motivation. Team use of study guides in social studies and science increases attention and emphasizes significant concepts, assuring the learner of mastery. Increased opportunity to respond to learning is provided when "taking turns" reciting is replaced with three-man-team responses to the same questions, with responses recorded by the team scribe. Team specialties in social studies, assigned six weeks in advance of the appearance of the topic in the course of study, produce displays which enrich the learning of all pupils. Remedial work, or intensive practice at points of common weakness, is suitable for learning teams, especially if self-directing, self-correcting learning "packages" are available.

The teacher is the key figure in the team-learning classroom. She

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sets the learning tasks and reacts to team products even though she does not mark them; she decides the make-up of most teams; she analyzes and evaluates the individual tests of achievement; she balances the day between team learning and whole-class activities; she plans the program of enrichment; she disciplines when non-working noise appears in a group, usually by having pupils work alone at the team task. The quality of her direction, planning, and enthusiasm determines whether team learning is vigorous and disciplined, or whether it results in confusion and disorder.

Pupil-team learning requires no change in school organization; it may be adapted to self-contained classrooms, to ability grouping by subjects, to departmental teaching, to television or other programs of mass presentation, or to teacher-team programs. Its most extensive use to date has been in self-contained classrooms, to which it brings many of the advantages of the ungraded elementary school, yet maintains the single teacher responsible for most of the instruction.

The major project to date in use and evaluation of pupil-team learning was in Dedham, Massachusetts, during the academic year 1958-59. A U. S. Office of Education contract enabled the study to be made in forty-seven self-contained intermediate-grade classrooms in eight elementary schools. The problems and techniques in the conduct of the Dedham program may be useful in setting up and evaluating similar ventures.[1]

Accepted protocol for initiating new educational ventures calls for enlisting the interest of teachers who then make the decision on acceptance. Another desirable method is that of starting new ventures in selected schools or classrooms, then spreading the practices as they appear to be valuable. Neither of these was used in Dedham. The superintendent had been a member of a university laboratory in elementary school supervision, in which the group of supervisors initiated differentiated instructional practices in classrooms of cooperating schools. During this experience it became apparent that a vigorous approach to pupil-team learning in an entire school system would be desirable. The decision to try the program for a year was made by the superintendent with the unanimous support of the school committee.

The critical period for any such educational venture is between the decision to make the change and the time of its inception in the classrooms. In Dedham, the announcement of the decision was fol-

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[1] A more complete description of techniques and outcomes of the Dedham study is found in the following: Durrell, Donald D., Scribner, Harvey B. and others. "Adapting Instruction to the Learning Needs of Children in Intermediate Grades." *Journal of Education*, Vol. 142 (December, 1959), pp. 1-78.

lowed immediately by demonstrations of pupil-team learning conducted by the research fellows who were to assist in the program. The advantages and possibilities of pupil-team learning in providing for individual differences was presented. Since this was done in May, with a summer to elapse before the start of the program in September, there was an interval in which teacher doubts and fears might grow. This is illustrated by a story told by one of the teachers after the program was successfully underway: "The proposal seemed to upset my own ideas about effective teaching. Since I had reached minimum retirement age, I decided to resign rather than to subject myself to the change. Then I had a better idea—I would start the program, then resign in protest."

A fall workshop was conducted by the research fellows, with all teachers and principals participating. This was concerned mainly with pupil-team progress methods in arithmetic and spelling. These subjects were chosen to begin the program for a number of reasons: they had always worked well in previous trials of team learning, pleasing both pupils and teachers; they could be started on the first day of school, using job sheets to accompany the arithmetic books;[2] they required less work of the teacher than conventional methods of teaching these subjects. The research fellows offered to help any teacher start the program in her classroom if she were uncertain how to begin, but most teachers preferred to introduce the program to their pupils.

The research fellows were in classrooms every day during the school year, assisting teachers with problems and making adjustments to the varying needs that appeared. Since both research fellows had been superior elementary school teachers and had experience in supervision, their suggestions were readily accepted. After team-progress methods in arithmetic and spelling were running smoothly, team-learning procedures were introduced in other subjects. The great shortage was that of self-directing, self-correcting materials, desirable for disciplined team learning. Groups of teachers met with the research fellows to prepare study guides, to find ways of adapting materials to various levels, to develop exercises for remedial instruction, to provide challenging learning experiences for superior pupils. The production of materials was shared by teachers; materials were exchanged to avoid duplication of effort. Successful new practices

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[2] McHugh, Walter J. and Manning, John C., *Arithmetic Job Sheets* to accompany *Growth in Arithmetic*. New York: World Book Company, 1961.

were spread by the research fellows, and there were constant demonstrations of promising approaches.[3,4]

The major evaluation of the program was made by comparing the achievements of pupils under the same teachers prior to and following the experimental year. Metropolitan Achievement Tests were used for general achievement comparisons. Although such tests are limited to a few facets of educational growth and depend largely upon retention of facts and skills, they provide a basis for comparison. Average achievements in the team-learning year improved six months over the control year in grade six, and four months in grade five, but there was no significant improvement in grade four except in spelling. Data were analyzed for subject achievement of pupils of different levels of intelligence, for boys and girls.

Changes in affective reactions of pupils, teachers, and parents were discovered by the use of various scales. Attitudes of pupils toward school subjects showed a statistically significant improvement in grade five; grades four and six did not change significantly. Social distance scales used by pupils revealed no significant changes, nor were any changes found in teacher ratings of classroom behavior of pupils. Teacher attitudes toward various aspects of the program were obtained by anonymous reactions to a questionnaire; they felt that the programs in spelling, arithmetic, and reading were "superior," but they rated social studies and language arts instruction as "good." Parent reactions toward the program, obtained by anonymous returns, were definitely favorable, with 95% reporting "very pleased" or "satisfied."

Perhaps the most novel feature of the evaluation program was that of a "Subject Service Analysis" based upon a standard interview with each teacher. Evaluation was made of the following adjustments to pupil needs in each subject; provision for levels of ability, provision for learning rates, special instruction for varying skills needs, self-direction and social learning, and enrichment of instruction. Each item was rated on a four-point scale, varying from routine uniform instruction, rated as "1," to major provision for the service needed, rated as "4." The analysis had undergone several revisions and was administered by outside experienced supervisors who were especially trained in

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[3] McHugh, Walter J. "Team Learning in Skills Subjects in Intermediate Grades." *Journal of Education,* Vol. 142 (December, 1959), pp. 22-52.

[4] Manning, John C. "Differentiating Instruction in the Content Subjects in Intermediate Grades." *Journal of Education,* Vol. 142 (December, 1959), pp. 52-66.

evaluating differentiated instruction. The reliability of the scale is .90, based upon separate ratings of fifty teachers.[5]

The purpose of the use of this scale was to determine the amount of actual change in instructional services to pupils. The degree to which any program achieves its intended services varies; some programs are found only on paper, but not in classrooms. The maximum possible rating on the scale was 92, the minimum, 24. The average rating of teacher service to pupils during the control year was 29.6; in the experimental year it was 63.5, a marked improvement, but still short of the maximum possible rating. Improvement in teaching the separate subjects was rated from most to least, as follows: reading, spelling, arithmetic, social studies, language arts.

All sorts of frustrations beset the experimenter who attempts to evaluate changes in a total educational program. The experimental program contains so many variables that it is impossible to ascribe the change in achievement to a single variable. The gains in arithmetic may have resulted less from pupil-team learning than from the provision to allow pupils to progress beyond the grade; one-third of the pupils completed two-years' work during the year. The use of study guides, the improved quality of discussion questions, the wide employment of pupil specialties, and the marked increase in public library circulation among these pupils are important to the gains shown. Some of the experimental factors may have been detrimental to learning but were more than offset by improvement resulting from other factors. And there is always the fact that the measures employed failed to include many of the accomplishments which were presumed to be taught.

Although the teachers were the same both years, the intelligence and initial achievements of pupils were the same, and the textbooks and school organization were unchanged, there were other variables which may have influenced the energy of the teachers and the achievements of the pupils. Any new program is stimulating, especially when it receives wide public notice and attracts constant visitors. The daily contact with the research fellows, and the increased classroom supervision by the principals must also be considered. All that can be said with assurance is that the program was effective in increasing achievement in grades five and six. The evaluation of pupil-team learning as a specific factor requires much more carefully controlled studies and several of these are under way.

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[5] Scribner, Harvey B. *A Scale to Rate Teaching Services in Grades Four, Five, and Six.* Ed. D. Thesis, Boston University, 1960. Microfilm copies may be obtained from University Microfilms, Ann Arbor, Michigan.

One of the tests of an experimental program is its continuance in the schools where it was employed. The pupil-team learning program has continued in Dedham in the two years following the study. Many of the techniques have spread to primary grades and to junior high school classes. The assurance of achievement under pupil-team learning has led to a "departmental day," with Wednesdays being devoted to extra instruction in music, art, dramatics, science, languages, and other areas in which teachers have special competence.

The demand for assistance in starting pupil-team programs in other school systems has been met by an area-centered "laboratory in team learning," offered each semester in different locations. Enrollment is limited to principal-teacher teams; no teacher may enter unless her principal is also enrolled. Demonstrations are given with full elementary classrooms in which pupils are unfamiliar with pupil-team activities. These demonstrations are followed by discussion of promising variations in methods and by exhibits of materials. A new school subject is demonstrated every two weeks. After each subject is introduced, teachers are required to use some form of differentiated instruction in that subject for the duration of the course. They report on success, variations, and problems; they prepare lessons cooperatively and exchange instructional materials. Principals are expected to go into classrooms of teachers not in the course to demonstrate pupil-team learning procedures. More than two hundred members of principal-teacher teams have attended the laboratory during the past two years. They have included teams from teacher-team schools, from ability grouped schools, and from schools with self-contained classrooms.

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PROBLEMS OF RESEARCH ON ELEMENTARY SCHOOL FOREIGN LANGUAGE INSTRUCTION

Aaron Süss Carton

At the "Conference on the Role of Foreign Languages in American Schools" held in Washington, D. C. in January 1953, a very small number of elementary schools around the country could report that they had foreign language programs. Foreign language was being taught in order to enrich the curricula of bright students, or because the children loved it so, or because the location or ethnic composition of the community made some foreign language study appropriate. There were many reasons; some reflected good educational thinking and some, even then, suggested adherence to a fad.

The movement for Foreign Languages in the Elementary School (FLES) seems to have burgeoned into a movement of national proportions shortly after the conference referred to. Today it is difficult to find a school system which was not recently, or is not now, or will not shortly be, confronted with instituting or dropping a foreign language program at the grade school level. Attitudes toward foreign language study are in transition. Community pressures for or against instituting FLES programs are frequently extremely intense. Thus the most essential question the educational policy maker addresses to the research scientist is: Should we teach foreign languages in the elementary school and, if so, why and how?

In order to help the educational policy maker with his decisions, the first question the research scientist should turn his attention to is: What are the advantages or disadvantages of starting foreign languages in the elementary school over starting instruction at any other level? The advantage may lie in the fact that childhood is the "critical period" when foreign languages are learned especially well. Perhaps early study facilitates good language learning later. Perhaps it merely gives us more time to work with the child. It is possible, moreover, that the advantages of early foreign language training are extraneous to the actual proficiency attained in the foreign languages. For instance, early foreign language study may improve attitudes toward foreign countries, or enhance the interest in, and ability to learn, additional foreign languages. Or perhaps the process of learning a foreign language has some special educational benefits for the improvement of "mental facility," or problem-solving techniques. Also,

we must remain alert to and explore the *possible harmful effects* of foreign language study on the mental functioning of the child and on his learning the remainder of the school curriculum.

If the exploration of effects of foreign language teaching in the elementary school leads the educator to decide that the institution of an elementary foreign language program is in order, the next series of research questions will relate to the administrator's problem of deciding which language or languages should be taught; whether the program should be instituted on a universal or selective basis; if selective, which pupils should receive the instruction; what methods should be employed; how much time should be devoted to foreign languages in the school day; and other such questions. These questions are actually related to the initial question on the desirability of teaching foreign languages in the grade school. Judicious planning of research can help solve some of the problems of *whom to teach which language, and how,* while we are still in the phase of seeking evidence related to whether foreign languages should be taught in the elementary school at all.

The data for discovering the advantages or disadvantages of elementary school foreign language training may be obtained through several lines of research. One approach is to start groups of children in foreign language at various ages and to study their language progress over the period in which they advance from elementary school into high school. The relationship between the rate of learning a language and the age at which foreign language instruction was started can be systematically evaluated by making comparisons periodically of the amount and quality of foreign language mastery achieved by each group.

In the Long Beach, New York, public schools, an evaluation of groups of students starting Spanish and French in the fifth and sixth grades in 1960-61 is in progress following the design described here. This comparison of groups on a longitudinal basis is the type of study that comes closest to examining the relationships we actually want to know because it takes place in the actual school setting. The most serious drawback of this approach is the fact that it will be at least two years before the first yield of relevant data becomes available. Furthermore, in the actual school setting, elementary school foreign language training generally seeks to develop skill in speech and auditory comprehension (the so-called "audio-lingual" emphasis) while secondary school foreign language study generally concerns itself with reading and writing. Thus, it is possible to discover whether elementary school foreign language training actually enhances the later acquisition of reading skills and gramatically correct writing.

In addition, research is needed to determine effects of the use of the audio-lingual method in the high school, and the effectiveness of the reading-and-grammar approach in the grade school.

In order to get a fuller understanding of the relationships between elementary school foreign language study and the kinds and quality of learning outcomes which occur, it is also necessary to conduct experimentation using various methods at various grade levels. FLES, at present, seems to be synonymous with the audio-lingual approach. While the prescribed "FLES methods" are the product of careful analysis of the nature of language and the psychology of language learning, it should not be forgotten that there are alternate analyses possible, nor that the relationships between effectiveness of the methods used and the grade level at which they are applied have yet to be investigated.

In the area of extraneous effects of elementary foreign language training, we might note that there is a complex of possible effects on the social, political, and cultural attitudes of the pupils. Erroneous assessments of foreign cultures can be developed as easily as correct assessments. The introduction of the study of one language may produce sympathy for the ethnic group speaking that language and yet enhance parochial and prejudicial attitudes toward other groups, or vice versa. Lambert[1] is conducting research which will illuminate some of these complexities with students at the high school level. However, despite vigorous allegations about the generally salutary effects of foreign language study on social, political, and national attitudes, the facts are simply not known for children at the grade school level. Also, we have no data on what the effects of early foreign language training will be on the *later* attitudes of these pupils. Since it would be surprising indeed if elementary school foreign language study *of itself* affected the social and cultural attitudes of the pupils, it would probably be wise to combine research on attitude changes in the children with experimental attempts to coordinate and integrate the foreign language program with the social studies curriculum.

It does not require much formal research to assume that, if a child can understand a foreign language, new worlds may open for him to which he would not otherwise have had access. Whether children do, in fact, utilize whatever foreign language skills they achieve for independent study is open to question. Again, research is needed, not only to discover whether and to what extent foreign language

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[1] Lambert, W. "A Study of the Role of Social Motivation in Second Language Learning." Research in progress, reported in *Title VI—National Defense Education Act of* 1958, Research and Studies, Washington: U. S. Department of Health, Education and Welfare, 1960, p. 11.

study encourages independent study of another country in the language of that country, but also on techniques of encouraging such activity.

Learning one foreign language may *interfere* with the ability to learn a second foreign language, or it may *enhance* this ability. There are some established psychological principles which would lead us to predict either result. In all likelihood, factors such as the technique of instruction, the aptitude configuration of the pupil, and the similarity or dissimilarity of the languages studied, will be found to be of significance in this regard. The enhancement of interest in learning additional foreign languages will probably depend on the methods of instruction and the success of the student in his courses.

Most of the process of learning a language consists of memorization. No matter what method is used, vocabulary must be learned, and grammatical patterns must be assimilated either by means of repetitious practice or mastery of rules. The data from the psychology of learning seem to point to the conclusion that practice in memorization does not improve the ability to memorize, although technical knowledge of some principles of memorization can improve learning efficiency considerably. The implication here is that the process of language education will not per se supply pupils with skills for acquiring additional languages. Language educators seem to be overlooking the possibility, however, that the analysis of relationships within a language may supply some very useful experience for solving a wide array of general problems. Some explorations in teaching children formal concepts of grammar have been made by Porter[2] and by Carroll *et al.*[3] But the effect of instruction in linguistic analysis, as a part of elementary school language education, on the ability to solve, say, algebraic problems, has yet to be explored by the research scientist.

The literature on bilingualism in children, in settings where two languages are actually spoken, reveals instances of losses in mastery of one or both languages, deficiencies in mental functioning, and diminished school performance.[4] Because these losses are also associated with a variety of additional factors, there is at present little

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[2] Porter, Douglas. "Nonsemantic identifiers of a grammatical category." Paper given at the 1959 convention of the A.P.A.; abstract in *The American Psychologist*, Vol. 14 (July, 1959), p. 363.

[3] Carroll, J. B., & Sapon, S. M. The Modern Language Aptitude Test, Elementary Form. Harvard University, 1960.

[4] Singer, H. "Bilingualism and Elementary Education." *Modern Language Journal*, Vol. 40 (December, 1956), pp. 444-58.

conclusive evidence to indicate that knowledge of a second language helps or hinders the child's mental development.

There is a question whether the fifteen or twenty minutes a day which are taken away from other subjects or added to the school day in FLES programs adversely affect learning in other areas. The research evidence on this point is not convincing. In general, there are indications that the inclusion of foreign languages does not reduce achievement scores in other areas. But many of the reports are based on uncontrolled experiments and on subjective observation by enthusiastic teachers, made under conditions in which the language teaching constituted enrichment for brighter students. Careful analysis of the effects on various categories of students (boys and girls, bright or dull, linguistically gifted or linguistically inept, from high and from low socio-economic groups, etc.), is also needed. Occasional studies in which it was found that elementary school foreign language study enhanced learning in other areas have failed to take into account the phenomenon which research workers call the "Hawthorne effect"—variation due simply to the fact that an experiment is being performed.

The question of which language to teach depends on the objectives of the foreign language training, upon what we discover some of the extraneous values to be, and upon several other factors. If the objectives of our program are to serve the national interest, we should select some language which is apt to be of political significance, such as Russian or Chinese. If we find that learning any foreign language helps in formulating intelligent attitudes, increases interest in other foreign languages, and improves the ability to learn languages, it is probably not important which language is chosen. It may be that foreign language study is most successful where the child's family or community has a positive attitude toward a certain ethnic group. In the study of the Long Beach FLES program mentioned above, languages were assigned arbitrarily to the children on an administrative basis. A study will be made of the preferences of the parents for various languages, and an effort will be made to discover the relationship between the relative success of the child in learning the foreign language and the language preference of his parents.

The decision to conduct foreign language instruction on a selective basis, or universally, depends on a number of factors related to our objective. In addition to knowing the general advantages of foreign language programs in elementary schools, educators must take into consideration the relative importance of other school subjects with children who show deficiencies in certain areas (e.g. reading), and the relative probability of success of the linguistically inept pupil.

Although there is extensive research on linguistic aptitude to help predict success in foreign language learning, it should be pointed out that success in foreign language learning is also dependent on the instructional method used, and on the student's motivation.

We see, therefore, that the question "Should we teach foreign languages in the elementary school?" is intimately tied up with the questions, "How?," "To whom?," and "What language?." Research on all of these is urgently needed to aid school administrators who are pressed to make decisions. School systems instituting elementary school foreign language programs have the responsibility of arranging for well-planned research in conjunction with their programs, and of reporting their findings.

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SOME PROBLEMS IN FIELD TESTING PROGRAMS FOR TEACHING MACHINES

Lewis D. Eigen

Ever since B. F. Skinner's article "Teaching Machines"[1] appeared in 1958 many educators have become interested in what may be a new aid to education. The popular press has exploited "good copy" in something which seems like a controversial issue. Parents have been presented advertisements for teaching machines which seemingly will eliminate all previous difficulties their children had in school. College students now have the chance to purchase a teaching machine program with a money-back guarantee if they fail the course.

Educators, however, are faced with the problem of determining whether teaching machines will offer any real help in solving the myriad problems which confront them. Most research on teaching machines has been conducted in the laboratory or at the college level. Relatively little work has been done in schools at the elementary or secondary level. Responsible educators must not allow themselves to be pressured into climbing on the "latest-thing band-wagon." Neither can they afford to ignore the recent work of experimental psychologists and educators on teaching machines, and pass it off as another "fad." The so-called "teaching-machine movement" is not a mechanized version of the Winnetka Plan. Certain things have been taught effectively with these devices. Each school system is faced with the eventual problem of making the decision as to what part teaching machines will play in its over-all educational effort. Regardless of the quality of the research and the experiences of others, every school administrator and teacher should wish to have some experience with teaching machines himself before attempting to make this type of decision. Personal experience with teaching machines should ideally include some sort of field testing in the schools.

The first step in any field testing program is planning, and planning must be based on knowledge and information. If one were to rely on the extravagant claims made by teaching machine manufacturers, teaching machine program publishers, and the popular press, he would be completely misguided. An excellent source of information is the NEA publication, *Teaching Machines and Programmed Learning.*[2] This is a compilation of many of the major articles in the field and includes an annotated bibliography on many others.

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[1] B. F. Skinner, "Teaching Machines," *Science,* Vol. 128 (1958), pp. 969-977.

[2] A. A. Lumsdaine and Robert Glaser, (eds.), *Teaching Machines and Programmed Learning: a Source Book.* Washington, D. C.: National Education Association, 1960.

Consultation with other educators and psychologists who have had the experience in the field is invaluable.

In the planning stage the educator will find that the first major problem which presents itself is the availability of teaching machines. Teaching machines which are available commercially range in price from two dollars each to over five thousand dollars each. Obtaining machines for field tests is at best a sizable financial investment, one which would certainly be worth while if it were known that these machines would have continuing use in the school. Since this is not the case, and since one of the purposes of the trial is to determine whether the machines would have any use in the schools, any school system which purchased teaching machines for a field trial would be extremely ill-advised. Field testing of teaching machine programs would be almost impossible were it not for the fact that one does not need teaching machines. Almost all of the currently available teaching machines can be simulated by means of books which have a different format than the ordinary textbook. The paper simulator of a Skinner–type teaching machine is usually referred to as a *programed textbook;* and the simulated counterpart of the Crowder-type teaching machine is called a *scrambled textbook*. While there are several theoretical advantages to a device, it has been demonstrated in two independent experiments that the teaching machine simulator (the programed textbook) is just as adequate a teaching device as a teaching machine itself.[3] While teaching machines offer certain behavioral advantages and may offer economic advantages in long range usage, it is completely unnecessary and would be unwise to purchase or rent these devices for an initial field test. Thus, the problem of obtaining the devices is eliminated by not using them.

It is obvious that the machine itself does not do the teaching. The machine can be likened to the binding of a book. What counts is not the color or shape of the binding but what is on the pages inside. The essential thing in a teaching machine is the program that is inside the teaching machine, or the program that is printed in the book-type simulator. Thus many educators prefer the term "programed instruction" to the term "teaching machine." The second major problem, therefore, is that of obtaining programs. Most educators initially react to this problem by planning to do the programing themselves, or to have someone in the school system do the programing. This is possible but difficult. One does not write a program in the same way one writes an article or a textbook. Experienced programers have found the task

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[3] Lewis D. Eigen and P. Kenneth Komoski, Research Summary No. 1, Collegiate School Automated Teaching Project, New York, 1960. Unpublished study performed by Bell Telephone Laboratories.

to be extremely time consuming. Klaus and Lumsdaine[4] have estimated that it takes experienced programers between one-half and three-quarters of an hour per frame. A typical one semester course may contain up to thirty thousand frames. A teacher who knows how to program is not going to program any substantial amount of material in his spare time. A great deal of released time (full-time, preferably) would be necessary to do the job. The person selected as the potential programer will usually be one of the outstanding members of the staff, and it is often difficult to rationalize the removal of his services in his current duties to undertake such a project. At least three school systems—Newton, Massachusetts; Denver, Colorado; and New York City—have already freed staff members to undertake the task of programing. In the case of New York City, two people are assigned full-time to a programing effort. Even if the staff members are freed to undertake this task, they must have some training.

Workshops in programed instruction are springing up in different parts of the country, and any educator who is contemplating a programing effort should either attend one of these or attempt to receive some training from one of the already existing programing groups. While "in-house programing" is possible for some of the larger school systems, it is relatively impractical for smaller school systems and independent schools. School systems not wishing to invest the time of personnel in a programing effort can utilize some of the already written programs.

One of the difficulties which arises when one contemplates the use of already existing programs is a curricular problem. A program defines the curriculum for the unit that it purports to teach. This is not always the desired curriculum for the school contemplating a field trial. Many of the already existing programs have either been programed by psychologists without the curricular advice of educators, or written from the commercial point of view of taking the current requirements common to all syllabi prepared by state boards of education. The former procedure often yields a program, the contents of which may be totally unrecognizable to the classroom teacher; the latter, a program which does not recognize recent curriculum advances and, by trying to appeal to the largest possible market, provides very little curriculum quality for any *part* of the market. There are, however, several programs available with which this problem does not exist. Programs, like teachers and textbooks, are not all of the same quality. At a recent conference on programed instruction

⁴ David Klaus and Arthur Lumsdaine, "Some Economic Realities of Teaching Machine Program Preparation," American Institute for Research, Pittsburgh, Pennsylvania, 1960.

held at the Collegiate School, most currently existing programs were described as "immature." For this reason it would not be wise to subject students to a semester's or a year's work with programs unless the school involved was unusually sophisticated in judging programs, and had some previous experience with programed instruction. Initial field tests should be made with short programed units, taking anywhere from two days to a month of the students' time.

Once a program is decided upon, the educator is faced with the problem of obtaining copies of that program. Most programs commercially available today are printed in a format requiring the student to destroy the program as he works it. While a program of this type might be purchased for an initial field test, programs *can* be printed in a format which will make them reusable. This format is most desirable for field testing since not as many copies of the program would be required as if the program were destroyed by use. For general usage it is obvious that the programs *must* be in reusable form.

The student population for the field test should be as heterogeneous as possible. While there is a great temptation to use very bright youngsters in a field test (the assumption being that they could better afford any ill effects that the program may have), the knowledge obtained by working with a heterogeneous group will have much greater value for future decisions than if the field test is performed with gifted students only.

The administration of a field test with programed instruction always produces one serious problem. Programed instruction makes it possible for each student to learn at his own rate, and the individual differences in the time it takes students to learn a particular unit are very great. In a recent experiment with programed instruction[5] the mean time for a group of 72 students to complete a programed unit on *Sets, Relations and Functions* was 296 minutes. Thirteen of these students finished in less than 240 minutes; one, in 151 minutes. Twenty-one students took more than 360 minutes to complete the program; one, over 411 minutes. This was a relatively homogeneous group with an IQ range of 105 to 135. With a more heterogeneous group, we could expect the differences to be greater. Thus it is essential that the teachers involved in the field test be aware of this difficulty and be prepared to have other work for the youngsters who finish early. If a currently available program is selected for the field test, the author or publisher may be able to provide a regression equation with which each school system attempting a field test could reasonably predict from students' IQ's the times it will take them to complete the program. Unfortunately, regression equations are available only on programs that have gone through quite a bit of testing.

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[5] Lewis D. Eigen and P. Kenneth Komoski, *op. cit.*

The last, and probably most important, problem of field testing a program is that of evaluation. Essentially, one is trying to find out something about the *method* of programed instruction, and this necessitates some sort of extrapolation on the results of the particular program that was used in the field test. Extrapolation of this type is always dangerous, and it would be wise not to place too much confidence in these extrapolations until several programs have been field tested. Many schools, after having had excellent reactions to their initial field tests, have found that subsequent experiences with programed instruction have not been so fruitful. The reverse has also been true. Remember, not all programs are of equal quality. The criteria for evaluating any program are basically the same as would be used for evaluating any method of instruction. Acquisition, retention, transfer, learning time, amount of professional supervision required, and the like, are all important. There is at least one internal evaluative criterion that can be used, especially in the Skinner-type programs. This is the error rate. If the students' error rate (on the program itself) is high, the program is probably not of good quality. A fifteen-percent error is generally considered high for programs. If, however, the error rate is low, this does not necessarily mean that the program is good.

One source of confusion which usually accompanies an attempted evaluation of a program is the lack of separation in the evaluator's mind of the program content, the technique of programing, and the philosophy of approach to the program. Often a program can be judged to represent a good programing technique while the content of the program is educationally questionable. Sometimes both content and technique will be good and the philosophy of approach will be one which might be described as a "rote" philosophy rather than one leading the students to discover relationships for themselves. It is important to keep these three facets to a program separate in an evaluation. A particular school might find a program in which the programing technique is good (the students learned what the program was designed for them to learn) but the content and philosophy of approach are not what the school would desire. It is wise to remember that many other programs will be forthcoming, and though a program suitable from all points of view may not be available today, it may be tomorrow.

Thus, with a firm commitment to objective research, it is possible for schools today to achieve the experience they will need for making intelligent decisions about their future use of programed instruction.

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THE ROLE OF EDUCATIONAL ENGINEER

Richard C. Anderson

Teachers and administrators are exposed daily to journal articles, pamphlets and books that summarize what research says about teaching arithmetic, what research says about teaching reading, or what research says about some other aspect of school practice. It is my contention that reviews of research rarely say anything of importance to school personnel about educational practice, or indeed, say anything of importance about educational practice to psychologists or sociologists.

The difficulty is not that research reviews are badly written, for the problem in bridging the gap between research and practice is not essentially one of communication. The problem, as I see it, is one of engineering. Engineering plays a critical role in the application of scientific principles in any area. Take the development of rockets, for example. One could not deduce a rocket or even a blueprint for a rocket solely from the principles of physics and chemistry. Physical laws serve as guidelines in the design and construction of a rocket, but there are countless decisions which must be made where scientific principles are of little or no help. A rocket could not be built without the use of rules-of-thumb and a good deal of trial-and-error. In short, good engineering is a crucial phase in the practical application of physical laws.

Engineering may be even more important with regard to social invention. I suggest that there is a need for a new role in education, that of educational engineer. Educational engineers might logically be employed by school systems, since, for one reason, the results of their work should be intimately related to educational practice.

The scientist seeks a complete and consistent explanation of phenomena. The heart of the scientist's work is the elucidation of functional relationships between variables. It is often said that education needs better theory and better research. There can be no doubt that this is true. Nonetheless, better basic research and theory will not in and of themselves result in advances in educational practice. This point is unmistakably clear when one examines the products of basic research. Let us agree to call basic research any enterprise to isolate variables and determine relationships among them. The product of basic research is a statement about the relationship among variables. It is my contention that these statements are *never* of very much direct value to practical educators, even when the statements are perfectly understood and every effort is made to apply them.

Consider one of the most widely agreed upon "laws" of behavioral science, the law of effect. The law of effect asserts that the strength of the learning of any response is related to the number of times this response has been reinforced. What is the response? What is a reinforcement? What should be done when a child simply doesn't give the desired response? These are questions which the teacher seriously attempting to apply the law of effect must certainly ask. Note that I am assuming that the teacher has a full understanding of the concepts "response" and "reinforcement." The questions that our hypothetical teacher would be compelled to raise are of a rather profound nature. What he must have are realistic, working definitions of "response" and "reinforcement" which have reference to human beings studying reading, mathematics, history, or science. Even if generally satisfactory answers to these questions were forthcoming, one could not expect teachers explicitly to apply behavioral science principles.

It would take an extremely perceptive, quick-witted teacher instantaneously to classify a response as meeting or not meeting a criterion of success, take steps to elicit successful responses from students who fail, and plan the next step for those who succeed. The definition of a successful response necessarily changes as the subject matter changes and as the student progresses. No matter how skilled and dedicated the teacher—particularly under the arrangement where the teacher must instruct 20-40 students an hour for 30 hours a week —consistent, subtle application of behavioral principles seems virtually impossible. The more likely rendering of the law of effect by the teacher who takes his behavioral science seriously is, "I praise my students when they do good work," or, still further from the target, "I maintain a warm, supportive climate in my classes." There is no good reason for believing that any human being, depending upon "on the spot" improvization, can precisely apply behavioral principles, at least in the enormous variety of contexts presented by conventional school arrangements. If education continues to depend upon extemporization by teachers to bridge the gap between research and practice, principles of learning are bound to be reduced to trivial generalities.

It is important to make a distinction between the work of the scientist and the work of the engineer. The scientist attempts to describe relationships among variables, whereas the engineer seeks to build socially-valuable products, devices, or machines. Chief among the products which an educational engineer might attempt to invent are prescriptions for teaching behavior. The simplest way to characterize a "prescription for teaching behavior" is as a meticulously

detailed and especially coherent lesson plan. A prescription for teaching involves an exact specification of every element of teaching behavior and the arrangement of the elements in a particular sequence. B. F. Skinner,[1] who is perhaps the most vocal and cogent advocate of educational engineering, has aptly termed this sort of lesson plan a "teaching program."

There would seem to be several fairly distinct steps in the development of a teaching program, including specification of the learning outcomes desired; analysis of the final behavioral goal into component skills or concepts; specification of what the students in the population with which the teaching program is to be used can be assumed to do or know; specification of the "moves" the teaching agent is capable of making; development and arrangement of the teaching behavior in phases or cycles in order to cause students to acquire component skills or concepts; and development of a "flow chart" which specifies each phase or cycle of teaching behavior and links the various cycles into a whole. At this point the first stage in the invention of a teaching program is complete.

One assumption implicit in the foregoing discussion is that good teaching always involves continuing interaction between teacher and student. Conventional textbooks, lectures, and TV presentations are ruled out to begin with. At any rate, the procedures briefly outlined above would probably have limited usefulness in the preparation of, say, a conventional textbook. A second assumption is that it is possible to reach a state where student response is highly predictable after every teacher act. Note that this does not mean that a state must be reached where one and only one student response has a high probability of occurring, but merely that all the major alternative types of student response can be specified.

One might seek a diversity of student response if an attempt were being made to develop "creative" or "imaginative" behavior of a certain sort. Subsequent teaching cycles can be made contingent upon the kind of student response at a given point. Different "branch" cycles of teaching behavior could be introduced depending on the variety of "imaginative" behavior emitted by the student and, of course, remedial cycles could be introduced when unsuccessful responses occur. Branch or contingent cycles will add enormously to the complexity of the teaching program. Hence, branch cycles should probably be used sparingly at least in the initial stage of program development. For this logistic reason, if no other, the Skinnerian dictum that the programer should aim to elicit one and only one student response at every point in the program is sound.

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[1] Skinner, B. F., "The science of learning and the art of teaching." *Harvard Educ. Rev.*, Vol. 24 (1954), pp. 86-97.

Insofar as behavioral science principles are valid and well-articulated, they can serve as guidelines for the invention of teaching programs. The teaching program should be deliberately constructed to embody behavioral science principles. Educational engineering is identified with the work of Skinner and associates but, as far as I can see, the point of view required for the development of teaching programs is not incompatible with any school of behavioral science thought. It is true that the engineering idea is inherent in Skinner's work whereas engineering implications must be teased out of other bodies of research.

The translation of basic research findings into social inventions would appear to be an extremely demanding intellectual task, requiring a great deal of sophistication and a thorough knowledge of the research literature. The importance of the Skinnerian position for educational engineering cannot be discounted; however, there are other theoretical positions and research findings which have great potential significance. I personally see, for example, some extremely interesting implications in Harlow's research on "learning sets,"[2] Piaget's studies of the development of logical thinking,[3] and Bruner's concepts of "strategy" and "essential structure."[4, 5] No doubt the basic ideas for the detailed development and arrangement of teaching behavior will come from research on learning and cognitive processes. The research of social psychologists and sociologists may well have implications with regard to systems of teacher-student interactions.

The first version of a teaching program should be based upon "sensible" assumptions and should represent an attempt to incorporate behavioral principles, but it must be recognized that at best the first version will be a crude approximation of the final product. The application of principles from even the relatively-advanced sciences always involves a lot of sheer trial-and-error. Unquestionably this will be true of behavioral science. The "degree of empiricism" in the behavioral sciences is, and probably always will be, very high. Trial-and-error, rules-of-thumb, and common sense will always play big roles in the development of teaching programs.

The teaching program must actually be run many, many times with students and successively refined into a finished product. Herein lies a major reason why it would be desirable if educational engineers

[2] Harlow, H. F., "The formation of learning sets." *Psychol. Rev.*, Vol. 56, (1949), pp. 51-65.

[3] Inhelder, B. and Piaget, J. *The Growth of Logical Thinking.* New York: Basic Books, 1958.

[4] Bruner, J. S., Goodnow, J. J. and Austin, G. A. *A Study of Thinking.* New York: Wiley, 1956.

[5] Bruner, J. S. *The Process of Education.* Cambridge: Harvard University Press, 1960.

were employed by local school systems. The developer of teaching programs needs continuing, ready access to groups of students. Furthermore, if the educational engineer were "on location," less of his time and energy would be consumed in traveling and negotiation with school administrators and teachers.

Rules-of-thumb and "know how" will develop with experience in programing. A considerable lore has already accumulated with regard to the programing of simple, mechanical teaching devices (Galanter).[6] Parenthetically, it is most important to realize that programing is not limited to mechanical devices. Programs can be developed for human teachers.

The successful educational engineer should probably have all of the training and instincts of the behavioral scientist. As such, he may often find guesswork and the inelegance of trial-and-error distasteful. He will be tempted to behave like a basic researcher, but this sort of behavior does not add directly to useful social invention. If the educational engineer is employed by a local school system, the economic sanction and social obligation which accompany his publicly-defined position will serve to bind him to a practical commitment.

The foregoing discussion may contain one clue as to why few if any striking, practical teaching methods have been produced by behavioral scientists, whereas certain mathematicians and physicists have in recent years developed some very interesting methods. There is a compulsion to observe ritual in the area circumscribed by one's professional identification. Outside this area the ritual can be ignored without loss of professional identity. Mathematicians and physicists have employed rough-and-ready tactics when dealing with problems of teaching and learning. These tactics, which would have been unthinkable to them when dealing with problems in their professional specialties, have apparently yielded practical dividends. The thesis is that behavioral science ritual is not entirely compatible with useful social invention. It is for this reason that I urge that the role of educational engineer be developed in local school systems, where it can be given a thorough-going practical definition.

There is, I think, a good chance that educational engineering could lead to some important innovations in educational practice. If I am not mistaken, historians of science believe that until recently engineering made more contributions to physical science than physical science did to engineering. Educational engineering may have similar contributions to make to behavioral science.

⁶ Galanter, E. Editor. *Automatic Teaching*. New York: Wiley, 1959.

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SCHOOL-UNIVERSITY COOPERATION AND THE
LEXINGTON PROJECT

Robert H. Anderson

One of the more interesting and important developments that may be noted on the educational scene today is a tendency for school systems and universities to join forces in the search for better school practices. One such partnership has existed in New England since 1957 in the form of the School and University Program for Research and Development (SUPRAD).[1] Harvard's Graduate School of Education is joined with the public school systems of Concord, Newton, and Lexington, Massachusetts, in a broad program of studies whose general focus is upon personnel quality in the schools. A large enterprise supported by SUPRAD has been the teaching-teams project in Franklin Elementary School in Lexington, a project begun in 1957.

A number of descriptions of the Franklin School Project are presently available.[2] This article describes certain problems and opportunities that arise from the existence of such a project under school-university sponsorship.

SUPRAD policies are made by an administrative board whose members include Harvard faculty and the superintendents of the three school systems. The board allocates funds to approved projects and gives general direction in the same sense that boards of education direct public school operations. Implementation of SUPRAD board decisions obviously requires the cooperation and approval of the three boards of education. Happily, relations have been cordial and productive to date, but the implications of this unique relationship for long-range research and development are very challenging.
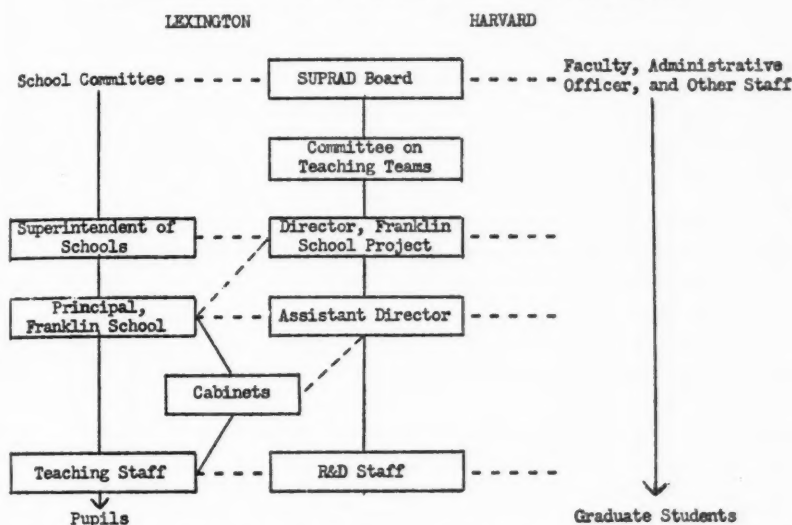
As Director of the Franklin School Project, appointed by the SUPRAD board, I have a direct and intimate working partnership with the Lexington superintendent, Medill Bair. We are guided in policy formulation and basic planning by a "steering committee" of which I am chairman and which includes both Lexington and Harvard personnel. The project's research-and-development staff consists of an Assistant Director, several consultants from Harvard, and other research workers. The Assistant Director has essentially the same relationship to the principal of the Franklin School as I have to the superintendent. He also serves as a member of and consultant to the Administrative Cabinet (principal and team leaders) and the

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[1] See Francis Keppel and Paul A. Perry, "School and University: Partners in Progress," *Phi Delta Kappan,* Vol. 42, (January, 1961), pp. 174-80.

[2] See, for example, *The Nation's Schools,* Vol. 65 (May, 1960), pp. 62-65, and (June, 1960), pp. 75-82; or *School Review,* Vol. 68 (Spring, 1960), pp. 71-84.

Instructional Cabinet (principal, leaders, and senior teachers) of the school. Thus the relationship of positions might be drawn roughly as in Figure 1.

FIGURE 1
Administrative Chart of the Franklin School Project

LEXINGTON   HARVARD

School Committee - - - - - | SUPRAD Board | - - - - - Faculty, Administrative Officer, and Other Staff

| Committee on Teaching Teams |

| Superintendent of Schools | - - - | Director, Franklin School Project | - - - - -

| Principal, Franklin School | ← - - - | Assistant Director | - - - - -

| Cabinets |

| Teaching Staff | ← - - - | R&D Staff | - - - - -

Pupils   Graduate Students

The inter-relationships of personnel in Figure 1 are complicated and certain questions about them are still not completely answered. For example, should all recommendations of the Committee on Teaching Teams be approved by the Lexington School Committee before they can be implemented in the school? Can the Project Director direct the school's principal to take—or refrain from taking— some specific action? Can R&D personnel impose controls for research purposes? What lines of authority and channels of communication are to be observed under what conditions? What does the principal do when confronted with instructions or information from SUPRAD personnel which apparently conflict with school policy or procedure? Answers to these and similar problems are evolving, of course. At present, some of the underlying premises and assumptions determining the school-university relationship are found in the following outline.

1. Responsibility for educational welfare of the child is legally invested in the Lexington School Committee and its employees.
   a. Transfer or surrender of this responsibility to another agency (in this case Harvard) is neither possible nor desirable.
   b. Fulfillment of the responsibility through enlistment of university support is both legitimate and desirable.

2. Promotion of research and development relating to the search for improved school practices (e.g., curriculum improvement and better personnel-management policy) is a legitimate and necessary function of both school systems and universities.
3. An interlocking directorate of combined university and public-school personnel is legitimate provided that the statutory (and other reasonable) obligations of both groups are not abrogated.
    a. A public-school agency profits through access to the university's resources in ideas, technologies, and personnel.
    b. A university profits through access to a clinical laboratory within which ideas and practices can be generated and tested.
4. The alliance of such generically disparate corporations as a public-school district and a private university requires operational mechanisms and adaptations of authority structure which are essentially unique in the experience of educational institutions.
    a. Financial control, other legal control, and the control of ideas or procedures are lodged differentially within the allied institutions.
    b. Personnel associated principally with one of the institutions develop loyalties and expectations to and toward both institutions; the same probably holds for antipathies and disloyalties.
    c. Top-leadership personnel (Superintendent; Project Director) thus are obligated to clarify all matters of operating policy, communications, and conflict-resolution so that personnel at all other levels are confronted with no serious uncertainty as to the behavior for which they are responsible.

Figure 1 also implies certain relationships between personnel at several different levels. These too have required further explication, as in the following outline.

I. Responsibilities of the related agencies
    A. Joint responsibilities
        1. Initiation and development of ideas and testable hypotheses
        2. Personnel (all Project participants, both sides)
            a. Initial selection and assignment (Superintendent and Director)
            b. Evaluation and change-of-status decisions (Superin- and Director)
            c. Supervision in role performance (as it relates to the goals of the project) : Assistant Director and Principal jointly responsible—
                Principal: Frame of reference is pupil and teacher welfare in broad sense (daily operations)

Assistant Director: Frame of reference is the research-and-development effort (ideas and practice in direction of long-term goals)

3. Budget planning and execution (Superintendent and Director)

B. Responsibilities principally Harvard's
1. Data collection
2. Training of personnel in roles

C. Responsibilities principally Lexington's
1. All legal relations with pupils, teachers, and generic public
2. Regular operation and management of buildings and program

II. General principles regarding the resolution of conflict

A. Conflict, as opposed to normal and healthy give-and-take in the operational process, should be resolved at the top level (i.e., between Superintendent and Director, or in extreme cases at Board level).

B. Points of appeal are to the Superintendent and Director as coordinate.

C. On the same principle, translations of power and/or policy from Board level should be made by the Superintendent and Director as co-ordinate.

III. Examples of problems in this area

A. Dislocations in traditions, beliefs, practices, or policies at local-school level because of
1. Specific project requirements—"planned change"
2. Accidental or incidental introduction of iconoclastic ideas by Project-related personnel

B. Differential expectations of the Project participants on the part of their direct-line employers and the other institution (failure of top-level leadership to explicate or reconcile expectations)

C. Dangers to the loyalty structure (competition of ideas and of personalities)

In addition to the foregoing comments, many of which require more complete description, it should be noted that the school-university relationship is further complicated by factors common to most interpersonal exchanges. Three different persons have served as superintendent in Lexington over the four years, and differences in their personalities (as well as their professional orientations) have contributed to three unique patterns of "co-ordinate leadership" with the Director (myself). Several different personalities have represented Harvard in the role of Assistant Director, also with different patterns of success. It may also be noted that the ability of the school

and university people to resolve conflicts or problems is dependent upon certain historical and environmental factors which may be hard to identify or understand in advance of an action or proposal. What might pass unnoticed in one situation or at a given moment, could become a crisis at another time or place.

The Franklin School Project is a very complex enterprise which in many ways defies description. Its objectives are multiple, within such broad categories as the search for better ways to group and to instruct children, efforts to redefine the professional in teaching, and efforts to modernize the curriculum. Each participant in the project, whether employed by Lexington or by the university, perceives the objectives in a somewhat unique way. Some emphasize the personnel-deployment aspects of the project in their thinking, others concentrate upon the development of a workable hierarchy which extends the influence of superior teachers, while still others are chiefly interested in the opportunities for building new instructional technologies. Perceptions of project objectives are somewhat related to one's own interests and role, so that the research people may pose different quesitons and gather different data than would the people in the schools. The reverse could also be true.

One's perception of objectives is very much colored by his background and training, and by his relative sophistication. The university staff has had no monopoly on sophistication; in fact, some of the university people have proved to be quite unaware of certain ideas and realities familiar to the seasoned and successful practitioner. On the other hand, the typical teacher and many administrators operate within a framework of habits, beliefs, assumptions, and techniques which are open to question. When persons of such varying backgrounds combine their energies and their questions, it is inevitable that a literal flood of problems and new questions should arise in their minds.

This has been a very brief treatment of certain aspects of the school-university relationship, which is sufficiently novel and important to warrant far more extensive analysis by sociologists and others. One thing its analysts will discover, and which is indicated in this article, is that an extraordinary kind and amount of communication is characteristic of the relationship. Considering the relative insularity of the typical teacher and university worker, and further considering the increasing complexity of the school's function, it would seem that an arrangement which quickens the tempo of professional discussion is potentially a good thing.

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TO THE EDITOR

I read with some interest your article "Intergroup Relations as a Challenge to Social Action" in the October 1960 issue of *The Journal of Educational Sociology.*

If I understand your basic message correctly I believe you will find every social worker in tune with your belief that intergroup relations is the most important issue of our times and that, as you so quaintly put it, the "restructuring" of society is essential in the search for humane values. The position of the social work profession on this issue is abundantly clear to any who looks at our official pronouncements in the booklet entitled, *Goals of Public Social Policy,* (see particularly pages 42-44).

On the other hand, while we can readily agree that discrimination based on race must be erased from the scene and that vigorous efforts must be constantly employed to this end, issue must be taken with you on your unwarranted attack on social work which you yourself describe as being "uncharitable" and "overdrawn." Your argument assumes that it is somehow wrong for social work to become a profession—the process through which more knowledge is created and conceptualized, more expertness developed beyond that possible for an amateur, common human values are articulated and inculcated among workers in the field, and ethical standards of behavior for workers are enforced for the benefit of integrity of service to mankind. You as a sociologist should know as well as anyone that the process of professionalization in any occupational field is "natural" and, in almost all cases highly desirable.

You seem to erect an entirely false dichotomy by proposing that vigorous social action and professionalization are antithetical. History does not fully document your argument. In the case of social work your argument falls flat. If you had travelled, as I have, to the four corners of this country to visit the National Association of Social Workers local chapters you would find without exception a great interest in, and effective action by the social workers in social action, social reform, and efforts to modify public social policy. Hundreds of activities involving thousands of social workers are earnestly, and the record shows effectively, pursuing goals of human betterment and giving leadership to these ends. When future Dan Dodsons in the year 2000 write articles for your journal they will be pointing

to social workers of this time in somewhat the same way you have cited Jane Adams, Mary Simkhovitch, Frances Perkins, et al.

There are several other glaring inaccuracies in your article—for example "that few young people today desire to invest their lives in it as a profession" when as a matter of fact more young people, including a higher proportion of men, than ever before in history seek admission to the profession and the professional schools. Or, for example, that the professionalization of social work "has tended to remove the social worker from the arena of action, make him a handmaiden of the status quo, and rob him of the dynamic which made his forebears great" when as a matter of fact at local, state and national levels the social work profession is deeply engrossed in social action, serves as a constant needling conscience to society to modify and improve the culture of which are part, and accomplishes more by dynamic, effective work along a dozen fronts than our forebearers did despite their "visibility" and their undenied accomplishments.

But despite your attack upon my profession, and with forgiveness given for your mistakes of fact and argument presented, I join you wholeheartedly in your basic point that in our attempt to serve people we must work for a society which will provide opportunities for self-fulfillment rather than take as our objective a service which helps people to adjust to an unsatisfactory society. The social work profession stands united on the former, despite the fact that some of the social institutions (social agencies) for where we are employed may not be always be so clear on this.

JOHN C. KIDNEIGH, *President*
National Association of Social Workers
U. of Minnesota

(*Author's note*: The statement was not intended to be an attack on social work. No one decries professionalization. The author believes it remains to be seen whether our helping professions can press as vigorously for social reform when they have "arrived" as they did when they were more marginal to the status system. He submits that the preoccupation with social service, case work, and methodological purity during the past 20 years to the deemphasis on social action, is testimony to his hypothesis. If the article helps to provide a warning that the social role of the professional in a society is one which is not mortgaged to any one social class or group, it will have served its purpose. Dan W. Dodson)

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